Eiler Receives 2002 James B. Macelwane Medal

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John M. Eiler was awarded the 2002 James B. Macelwane Medal at the AGU Fall Meeting Honors Ceremony. The medal is given for significant contributions to the geophysical sciences by a young scientist of outstanding ability.

Citation

"It is a great pleasure to present my friend and colleague John Eiler to receive one of this year's Macelwane awards. John's specialty is the application of stable isotope geochemistry to elucidate processes and conditions on the Earth and other planets. I think that the best way to introduce him is to tell a story about how he stumbled into one of his many projects, since it says a great deal about how he works and what is special about him.

"After receiving his Ph.D. from the University of Wisconsin, where he worked with John Valley on the diffusive re-equilibration of oxygen isotopes in granulites, John came to Caltech as a postdoc to work with Sam Epstein and me on the fractionation of carbon isotopes between vapor and silicate melt. But his work took an important detour not long after his arrival. A group of us got together weekly to discuss a paper we have all read. One week, the group met in my office to discuss a paper that reported the important result that radiogenic Pb and Nd isotope enrichments in lavas from the Pitcairn seamounts in the South Pacific are correlated with ^{18}O-enrichments. This represented compelling evidence for the recycling of sediment into the mantle sources of these lavas by subduction. At the time, the results of this paper were described as the 'smoking gun' for recycling of sediments into hot spot magmas. For a variety of reasons, the group was dubious about the result (to be honest, I thought the paper was pretty good!). As the group was breaking up, John stated that the right way to approach this problem would be to apply the then-novel technique of laser fluorination to olivine: This would have the advantage of dealing with an abundant mineral in relatively unfractionated basalts that could be isolated so as to avoid alteration (and of simplifying corrections for any oxygen isotope fractionation that might have occurred on mantle melting or subsequent crystallization). Ken Farley, who also attended the reading group, replied that he had a series of olivine-bearing samples from Pitcairn Island and that if John was serious about this, he could actually do the measurements on these samples. John, Ken, and I stayed behind after everyone else left, and John designed a project doing oxygen isotope analyses via laser fluorination of olivines from Pitcairn Island. John quickly did the analyses in John Valley's lab back in Wisconsin and demonstrated that at least for the Pitcairn hot spot there is no correlation between oxygen isotopes and the radiogenic isotope signature, and thus that the skeptics in the reading group were right.

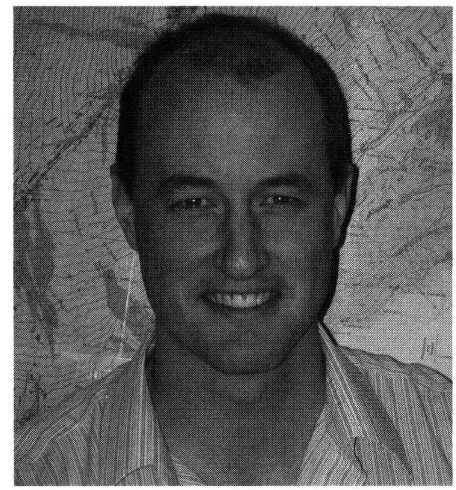
"With this as a start, John expanded this small project to a wide range of investigations of oxygen isotopes in magmas from all the major basaltic igneous environments (mid-ocean ridges, subduction zones, ocean islands, and continental flood basalts), discovering important correlations between oxygen isotope ratios and other geochemical parameters (including the much sought-after 'smoking gun' of subducted sediment, with its distinctively high $^{18}O/^{16}O$). A key to this was the use of the laser fluorination techniques pioneered by Zach Sharp, John Valley, and others, which allowed small amounts of sample to be analyzed with a precision better than 0.1 per mil, thereby opening up a whole new world based on what previously were variations in oxygen isotopes that were too subtle for detection. This work adds up to a remarkable contribution, providing a powerful new tracer for distinguishing the origins of various mantle reservoirs. Simply put, John has used his expertise with laser fluorination and his geological insight to make landmark contributions to our understanding of the nature and origin of chemical and isotopic heterogeneity of the Earth's mantle.

"I believe that the work I have described here tells us a great deal about this young scientist: John's willingness to pursue boldly a new direction that sprang from as unlikely a source as our reading group (and it is important to emphasize that he had at this point essentially no research experience in igneous geochemistry), his rapid conversion of this idea to a reality, and the range of insights he has subsequently obtained are all indicators of a remarkable scientist.

"I cannot fully convey the broad range of topics on which John has worked and continues to work. He has been willing to tackle a wide range of new problems outside his nominal areas of expertise, ranging from the question of the conditions of formation of carbonates from meteorites from Mars, to the development of the ion microprobe as a quantitative tool for oxygen isotope analysis, to the study of isotope fractionations between mineral surfaces and gaseous CO_2 and H_2O and their implications for the cycling of volatiles on Mars, to the study of hydrogen isotopes in chondritic meteorites, and to the development and application of a new technique to measure D/H ratios on very small amounts of molecular hydrogen from the atmosphere. His fearlessness in attacking this range of problems in Earth and planetary sciences, his ability to get things done on a very broad front, and his magic touch at finding interesting and important results are astounding.

"In summary, John Eiler is emerging as one of a small group of leaders in the next generation of geochemists. In my view, the Macelwane Award is well-deserved recognition by our community of his energy, intellectual courage, insight, accomplishments, and potential. Moreover, as I'm sure you will see from his acceptance, all this is wrapped up in a disarmingly folksy and extremely likeable package. Ladies and gentlemen, John Eiler."

—EDWARD M. STOLPER, California Institute of Technology



Response

"Thank you, Ed; it is a great honor to receive this distinguished award and doubly so to get it at the hands of someone who has been so instrumental in shaping both our disciplines and my career. I'm very grateful to the American Geophysical Union and to Macelwane Medal nominators and selectors for recognizing the work of my colleagues and me. Perhaps the best purpose of junior scientist awards is to encourage people early in their careers to live up to their potential; I appreciate this encouragement and will keep it foremost in my mind in the years to come.

"One of my first reactions on learning I would be given the Macelwane Medal was to look at the list of past recipients—if you haven't looked yourself, it's impressive, intimidating, really—and to check what they said. They generally give a biography of sorts, so I'll do the same. I started my career as a hired porter, hauling canoes and catching fish for Beloit's Hank Woodard on his field trips to the Canadian shield. The fishing was the only part I took very seriously until I followed my future wife to the University of Iowa. There I met Tom Foster and Mark Reagan, who nurtured my scientific interests, convinced me I could be good at this job, and packed me off to graduate school in Wisconsin where I worked for John Valley. John had a tremendous influence on me. He taught me the ethos of a lab scientist, introduced me to the idea of scientific debate, and gave me a foundation of classical training that I call on to this day. He also provided unfailing support to my research after I left Wisconsin. I also must recognize the help I received during this period from Lukas Baumgartner, who first taught me how to be quantitative about problems, and both Colin Graham and John Craven, who nursed me through many weeks of ion probe work at the University of Edinburgh.

"Naturally, I thought I'd learned all there was to know by the end of graduate school. I was wrong, of course, but couldn't see it until coming

to Caltech as a postdoc. This place had, and continues to have, an indescribable effect on me. It surrounds one with amazingly talented people, many of whom have created new disciplines out of whole cloth, doing a kind of science I hadn't known existed. Ed naturally deserves the most credit for influencing me, since he was an almost daily mentor throughout my years as a postdoctoral fellow. He is largely responsible for whatever taste in scientific problems I might have learned. Ken Farley was also key to my development then, and continues to be my model for what a young professor is supposed to do. Of course, Hugh Taylor and Sam Epstein have been a constant and inspiring presence; I don't think a week goes by when I don't find myself wondering what they would have done with some problem with which I'm faced. More generally, the institution as a whole is a supportive, collegial place where the love of science colors everything you do. I would also like to recognize the host of talented students and postdocs who are responsible for much of the science I've been involved in since starting a lab.

"It is customary in these speeches to provide a quotation from a role model. I'll give you two from my senior colleagues at Caltech, who are known for getting right to the point. You will have to guess who they are; I have to live with these people after all. One once asked, 'So what can you do that I can't?' I suppose you could take that several different ways; I decided it meant young scientists have to bring something new to the table, and I have tried to follow it as often as possible. The second asked 'You know all those retired old guys? Well, they made plate tectonics. What are you going to do?' There is no easy answer to that one, but the idea is inspiring nonetheless. I like to think he was saying we are not in the business of chipping away at solved problems—we're supposed to be explorers and revolutionaries. I don't know if I can be either, but I appreciate being told I should try.

"I would like to acknowledge my wife, Jane—the lovely woman in the black dress up here at the front—and my children, Maddy and Kate. Jane is almost entirely responsible for the fact that I can pass for an adult and sustains me in all sorts of ways. My children naturally run me ragged, but also keep me young—childish, really—and excited about the world.

"Finally, I would like to recognize all of you, both for coming out to help us celebrate this occasion and for being an inspiring community of colleagues. Thank you for this recognition, for your confidence, and for your help."

—JOHN M. EILER, California Institute of Technology

In Brief

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Helping state/local governments use remote sensing data The U.S. National Research Council (NRC) has released its findings and recommendations for assisting state and local governments to overcome obstacles to the efficient acquisition and use of remote sensing data.

Among other measures, the NRC recommended that the federal government should take the lead in establishing standards for digital spatial data and information products, in collaborations with professional organizations, state and local governments, and vendors. This would serve to reduce costs, improve data transportability, and make it possible to standardize technical training and quality assurance for state/local users.

The NRC also identified that state/local government users often have need of general infrastructure, support, or guidance on how they might take advantage of remote sensing data or applications programs supported by the federal government. The council recommended that the relevant federal agencies develop formal points of contact for local/state government representatives who need such technical assistance. It also made a number of recommendations for encouraging the build-up of a large, effective public-sector market for these remote sensing data products and services; this would enable state/local governments to obtain lower bids for such products and services over time.

The entirety of the NRC's findings are in a recently published report, "Using Remote Sensing in State and Local Government: Information for Management and Decision Making."

—JUDY JACOBS, Assistant Managing Editor, *Eos*